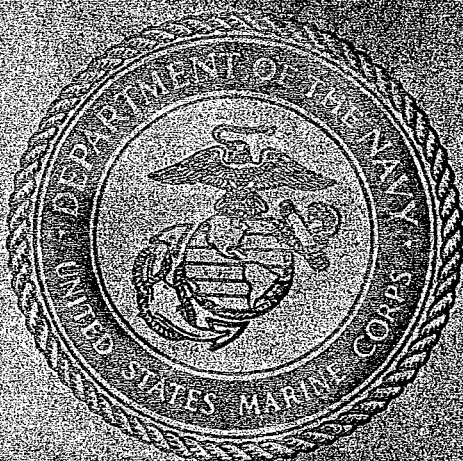


# *Manning and Equipping Combat Engineer and Engineer Support Battalions*



## *FINAL REPORT*

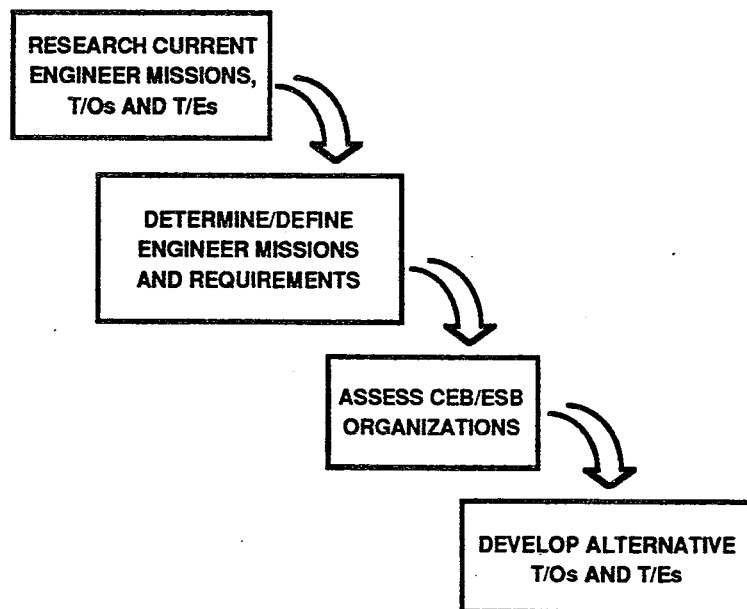
*31 January 1994*

Combat Service Support Branch  
Requirements Division  
Marine Corps Combat Development Command  
Quantico, Virginia 22134-5000

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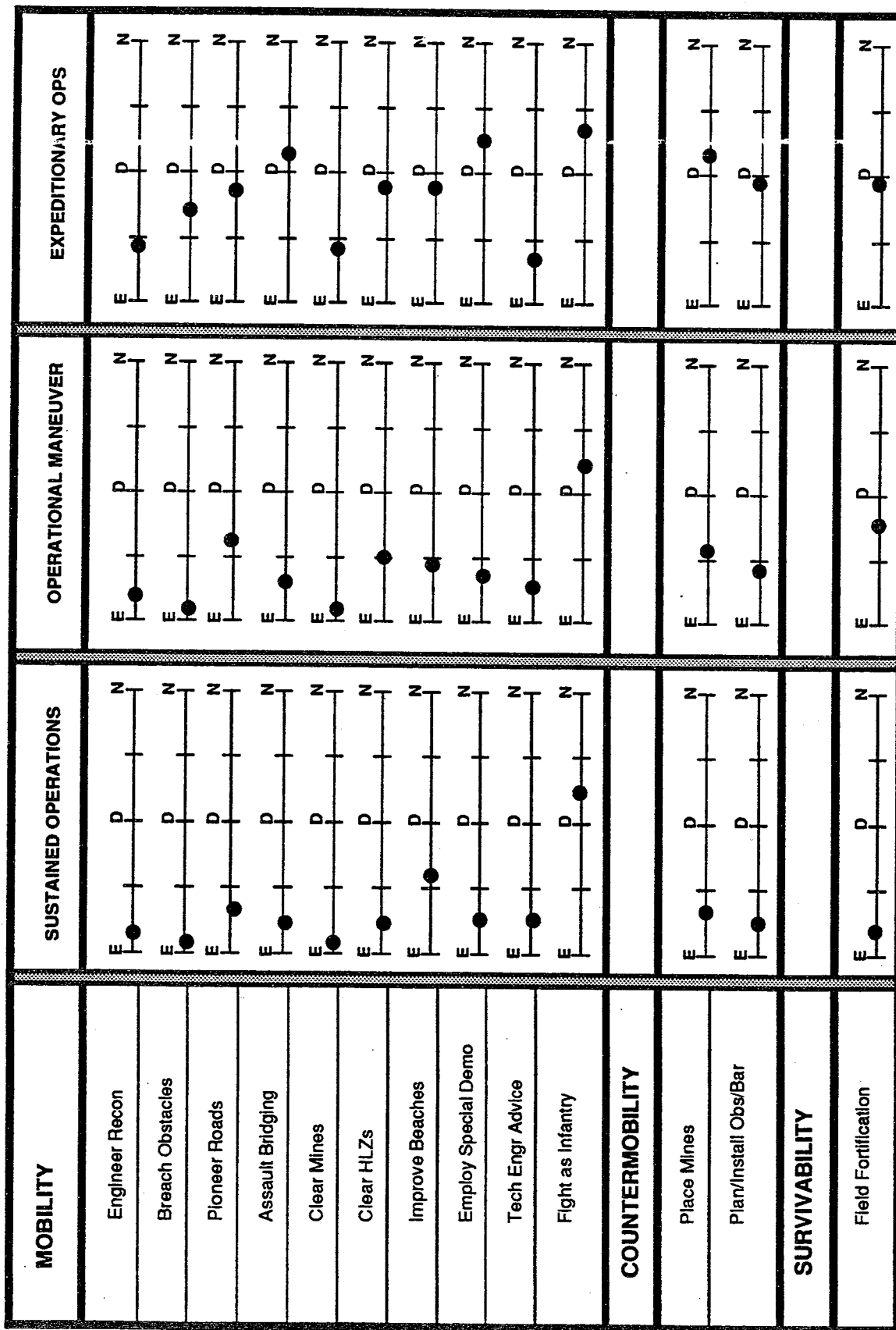
## B. PURPOSE

The purpose of this study, as depicted in Figure I-1, was to perform research to determine and define engineer missions and requirements for all MAGTFs, assess CEB/ESB organizations to satisfy these requirements, and develop alternative tables of organization (T/Os) and tables of equipment (T/Es).



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**FIGURE I-1: THE PURPOSE OF THIS STUDY IS TO PROVIDE RESEARCH AND ANALYSIS LEADING TO ALTERNATIVE T/Os AND T/Es FOR THE MAGTF ENGINEER BATTALIONS.**



E - Essential Task  
 D - Desired Task  
 N - Task Not Required  
 ● - Mean Score Of Panel Members

FIGURE II-8: PANEL MEMBERS RATED ENGINEER TASKS IN POTENTIAL WARFIGHTING ENVIRONMENTS.

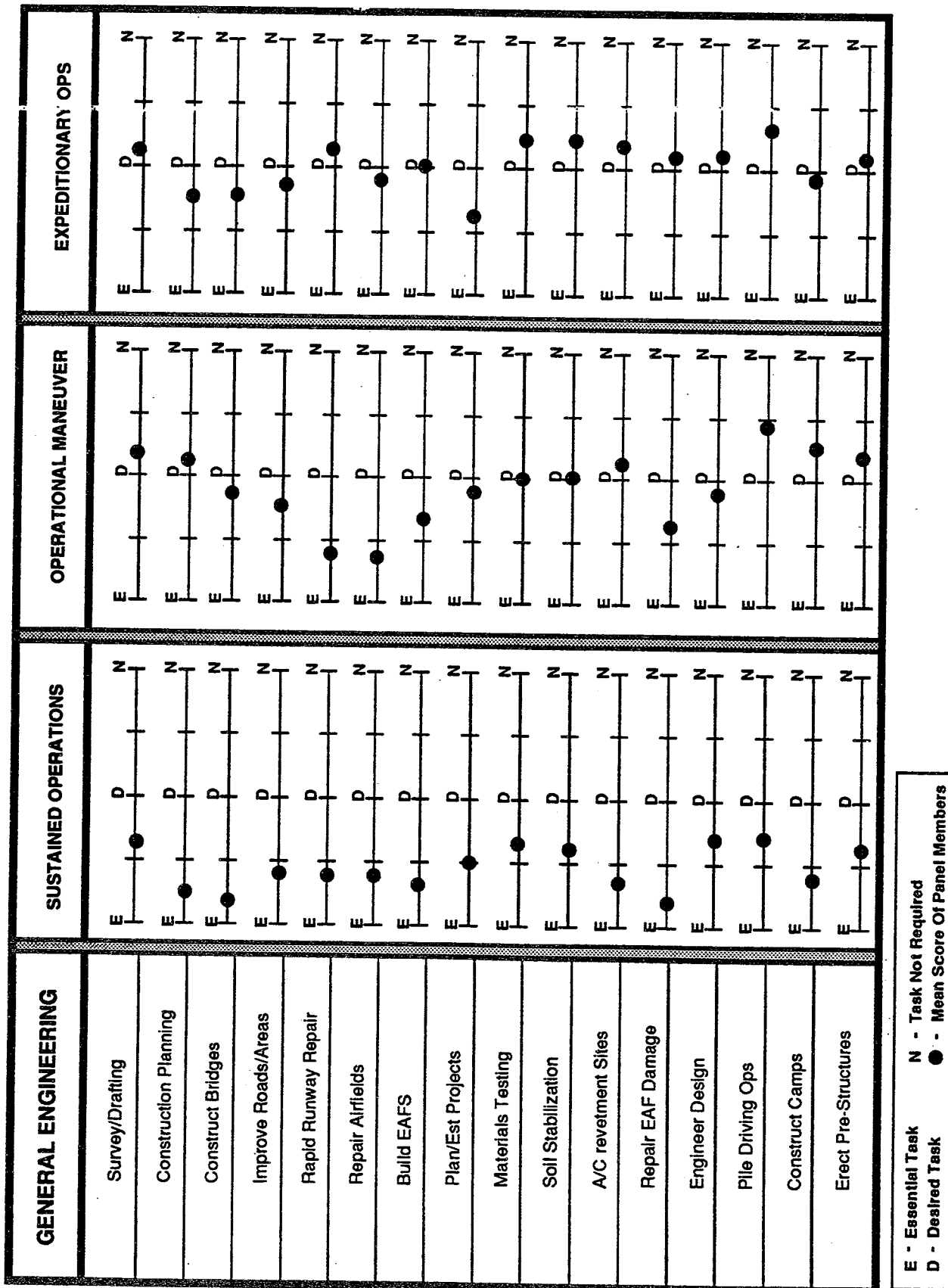


FIGURE II-8 (CONTINUED): PANEL MEMBERS RATED ENGINEER TASKS IN POTENTIAL WARFIGHTING ENVIRONMENTS.

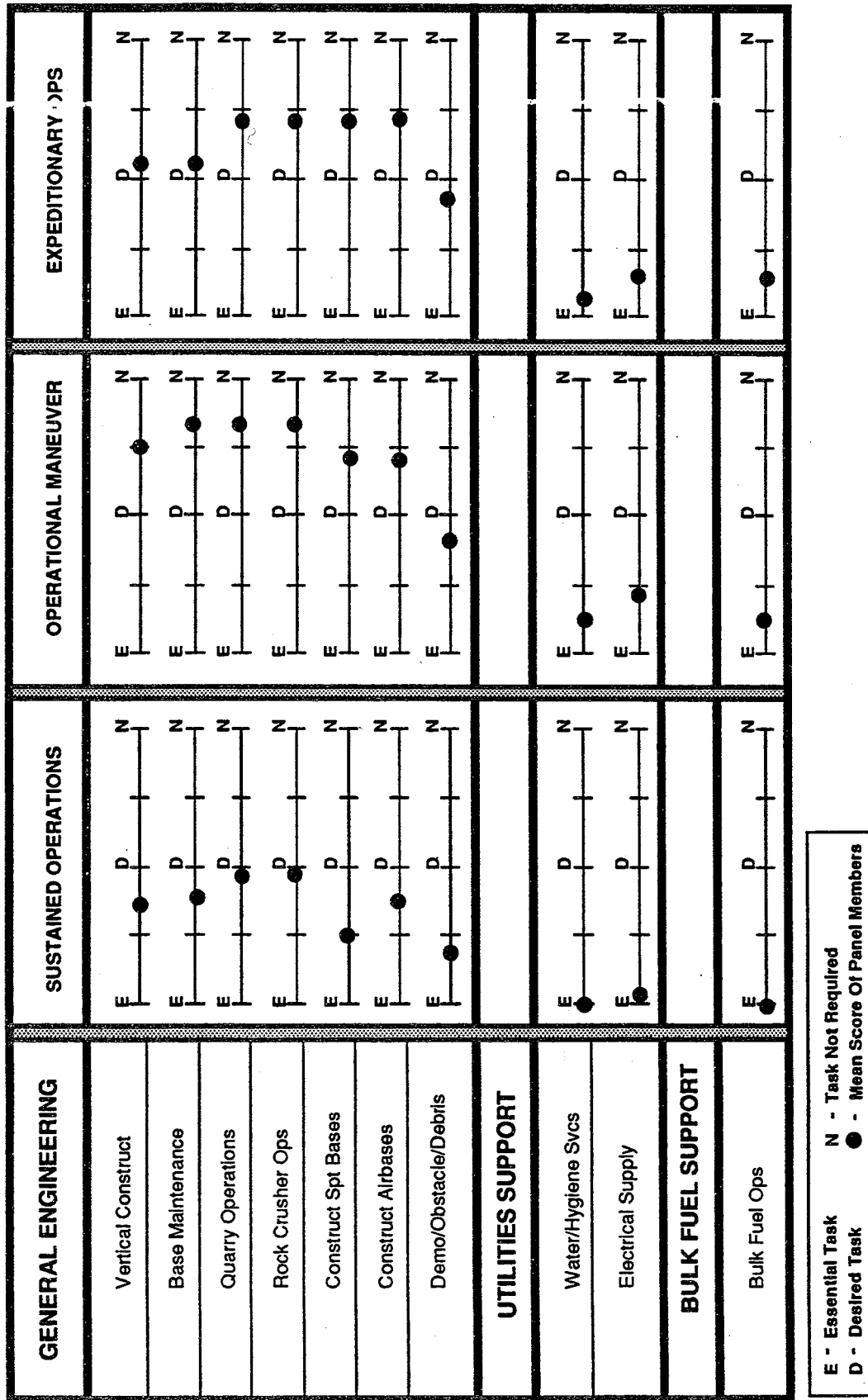


FIGURE II-8 (CONTINUED): PANEL MEMBERS RATED ENGINEER TASKS IN POTENTIAL WARFIGHTING ENVIRONMENTS.

A summary of the engineer tasks judged by the majority of respondents to be in the category of essential is shown below in comparison with the total number of tasks. These results indicate that respondents believe that engineer tasks essential to MAGTF mission accomplishment increase as the level of warfighting environments increases.

#### ESSENTIAL TASKS/TOTAL TASKS

	SUSTAINED OPERATIONS	OPERATIONAL MANEUVER	EXPEDITIONARY OPS
MOBILITY	8/10	8/10	3/10
COUNTERMOBILITY	2/2	2/2	0/2
SURVIVABILITY	1/1	0/1	0/1
GENERAL ENGINEERING	14/26	3/26	3/26

Essential/Total Tasks Matrix: Essential Tasks Increase  
With The Intensity Of The Operational Environment.

A summary of the engineer tasks judged by the majority of respondents to be in the category of desired or essential is shown below in comparison with the total number of tasks. These results indicate also that respondents believe that engineer tasks desired or essential to MAGTF mission accomplishment increase as the level of warfighting environments increases. Further respondents believe that the majority of engineer tasks are desired or essential for mission accomplishment in all warfighting environments.

#### DESIRED TASKS/TOTAL TASKS

	SUSTAINED OPERATIONS	OPERATIONAL MANEUVER	EXPEDITIONARY OPS
MOBILITY	9/10	9/10	7/10
COUNTERMOBILITY	2/2	2/2	1/2
SURVIVABILITY	1/1	1/1	1/1
GENERAL ENGINEERING	24/26	14/26	11/26

Desired/Total Matrix: Engineer Tasks Contribute To  
MAGTF Mission Accomplishment Across  
All Operational Environments.



The engineer tasks judged by respondents to be the least desired (e.g., judged mostly not required by respondents) are shown below. These results indicate that some mobility tasks are not considered important in Expeditionary environments and some general engineering tasks are less important in Operational maneuver and Expeditionary environments. It should be noted that some of these tasks that were considered to be least desired are inter-related and inter-dependent with other more desired engineer tasks. For example, the construction and repair of roads, bridges, and airfields often requires survey and drafting capability.

If additional decreases in active structure and equipment are necessary, the personnel and equipment associated with these least desired tasks should be considered for reduction. These least desired tasks are mostly general engineer support functions, which could be performed by Marine Reserves or other Service engineers.

### LEAST DESIRED TASKS

	SUSTAINED OPERATIONS	OPERATIONAL MANEUVER	EXPEDITIONARY OPS
<b>MOBILITY</b>	Fight As Infantry	Fight As Infantry	Assault Bridging Employ Special Demo Fight As Infantry
<b>COUNTERMOBILITY</b>			Place Mines
<b>SURVIVABILITY</b>			
<b>GENERAL ENGINEERING</b>	Survey/Drafting	Survey/Drafting Construction Planning  A/C Revetment Sites	Survey/Drafting  Rapid Runway Repair Materials Testing Soil Stabilization A/C Revetment Sites
	Vertical Construct	Pile Driving OPS Construct Camps Erect Pre-Structures Vertical Construct Base Maintenance Quarry Operations Rock Crusher OPS Construct Spt. Bases Construct Air Bases	Repair EAF Damage Engineer Design Pile Driving OPS  Erect Pre-Structures Vertical Construct Base Maintenance Quarry Operations Rock Crusher OPS Construct Spt. Bases Construct Air Bases

Least Desired Tasks Matrix: Some General Engineering Tasks  
May Be Less Critical To MAGTF Mission Accomplishment.

f. That MAGTF engineer organizations optimally designed to perform these more critical engineer tasks will be best suited for employment in the 1995-2001 timeframe.

The alternative CEB and ESB T/Os and T/Es developed within Task 4 of this study effort will be based upon accomplishing the more critical tasks as determined by the judgmental forecast shown in Figure II-8.

3. **Task 3 - Assess CEB/ESB Organization** (Portions of Task 3 are addressed in Task 4).

a. That engineer resources within and available to the MAGTF can provide at least limited capability in the complete range of doctrinal engineer tasks in support of deploying MAGTFs.

Interviews and research completed in the course of this study indicate that MEF elements possess engineer assets to provide at least limited capability to perform doctrinal engineer tasks. The review of existing and emerging OPLANs identify potential warfighting environments that could vary significantly in intensity, force levels, and duration. On the lower end of the warfighting intensity level, MEF engineer assets appear adequate, but on the upper end, the anticipated engineer requirements exceed MEF active force capabilities. Accordingly, the use of Marine Corps Reserve assets, Naval Construction Forces, Joint and Coalition forces, host nation support, and civilian contractors are envisioned.

MAGTF engineer organizations have equipment deficiencies that negatively impact their ability to provide complete engineering support across all required doctrinal tasks. A detailed discussion of the equipment deficiencies is contained in Appendix C and a summary is provided in Figure II-9.

**EQUIPMENT DEFICIENCIES**

AREA	DEFICIENCY
MINE DETECTION	Standoff Detection Magnetic Mine Detection Non-metallic Mine Detection
BREACHING AND PROOFING MINEFIELDS	Track Width Mine Plow Inadequate Breaching and Proofing Equipment
MARKING	Current Means Too Slow and Exposes Marines
COMBAT VEHICLES	Combat Breaching Vehicle Countermine Vehicle
ASSAULT BRIDGING	Breaching Anti-Tank Ditches and Narrow Gaps
COMBAT EXCAVATION	Partially Fulfilled By M9 ACE
RAPID MINING	Current Mines Hand Emplaced

**FIGURE II-9: THERE ARE DEFICIENCIES IN NUMEROUS AREAS OF ENGINEER EQUIPMENT.**



ALTERNATIVE	DESCRIPTION	STRENGTH
ALTERNATIVE #1	CURRENT FSPG STRUCTURE OF THE CEB AND ESB	95/2275
ALTERNATIVE #1A	ALTERNATIVE #1 WITH ENGR SPT CO ASSETS MOVED TO H&S CO WITHIN THE CEB	91/2272
ALTERNATIVE #1B	ALTERNATIVE #1 WITH ENGR SPT CO ASSETS DISTRIBUTED TO THE 3 ENGR COs OF THE CEB	86/2284
ALTERNATIVE #2	CURRENT FSPG STRUCTURE WITH CEB ENGR SPT CO ASSETS DISTRIBUTED TO THE ESB	86/2283
ALTERNATIVE #3	COMBINE CEB INTO THE FSSG ESB RETAIN COMPANY STRUCTURE	77/2289
ALTERNATIVE #3A	ALTERNATIVE #3 WITH THE COMBINED ENGR UNIT UNDER MEF C&C; DIFFERENT COMPANY STRUCTURE	66/2123
ALTERNATIVE #3B	ALTERNATIVE #3 WITH THE COMBINED ENGR UNIT UNDER MEF C&C; BULK LIQUIDS TO OTHER FSSG UNIT	62/1692
ALTERNATIVE #4	CURRENT FSPG STRUCTURE FOR ESB; CEB ELIMINATED AND THE ENGR COs ASSIGNED DIRECTLY TO THE REGIMENTS	65/2033
ALTERNATIVE #5	COMBINE ESB INTO THE DIVISION CEB	57/1588

FIGURE II-11: SEVERAL ENGINEER STRUCTURES COULD BE USED FOR TOMORROW'S MAGTF.

e. That the best alternative structure for use by the FMF is the alternative that provides the most flexibility to the MAGTF Commander.

Throughout the course of this study effort, the re-occurring theme for planning future MAGTF employments was uncertainty. The locations, missions, and length of tomorrow's operations are expected to vary considerably within each MEF. Accordingly, the key attribute for engineer structure is the need for flexibility to rapidly respond to a variety of MAGTF missions that range from short term CINC force options to long term Joint Task forces in sustained operations involving forcible entry and other high intensity missions. Engineers could be components of smaller MAGTFs, major contributors for larger MAGTFs, or even operate somewhat independently as the component of a special MAGTF such as the recently planned Task Force effort for Haiti.

Flexibility and responsiveness to a wide variety of potential warfighting environments and contingencies is the deciding factor in selecting alternative #3A and #3B as the best options for future MAGTF engineer organizations. Alternatives #3A and #3B are recommended as the best solutions for the organization of MAGTF engineers because the consolidation of engineers into a single element under the control of the MAGTF Commander provides the greatest degree of flexibility and responsiveness for the MAGTF.

The missions for engineers involve performing tasks that are dependent on the operational tempo of the MAGTF as a whole and not necessarily on any one organization within the MAGTF. Centrally managing the engineer assets from a general support/reinforcing position at the MAGTF level will allow the MAGTF Commander to place scarce engineers assets at the location most needed. Furthermore, MAGTF engineers are unique in that they provide both combat support and combat service support skills. The central location and management of these skills from the MAGTF level will allow the MAGTF Commander to consolidate engineer resources and allocate these resources to specific combat support and combat service support requirements as the operational tempo of the MAGTF fluctuates.

In addition, centralizing MAGTF engineers into one organization will co-locate unique and numerous engineer equipments into a single unit. Because engineer equipment tends to be used less in garrison than in wartime environments, there appears to be an excess of equipment in peacetime but a shortage in wartime. Typical examples of this situation are the types and capacities of generators in the FMF. In garrison there are generally too many of each type, whereas in recent Southwest Asia experience, there were not enough generators to satisfy all MAGTF requirements. Central location and management of engineer equipment will facilitate MOS training and establishment of an equipment storage program for garrison-excess items. Centralization will also help identify further reductions in personnel and equipment that are not obvious in today's separate CEB and ESB structures. These reductions would enhance MAGTF strategic mobility through reduced lift requirements and perhaps allow some compensatory improvements in combat mobility vehicles or engineer-unique vehicles.

The various tasks involved in providing utilities support to the MEF are most closely related to the skills of engineers that any other occupational field within the Marine Corps. Providing MEF units with general utilities support such as hygiene, mobile electric power, and refrigeration has been historically associated with engineer organizations. Selecting alternative #3A and #3B as the best structures has the additional benefit of centralizing utilities under one MAGTF engineer organization. In the case of mobile electric power for example, the current level holder concept could be revised to allow for all Level 2 and above assets to be held by the single MEF engineer organization. This consolidation of generators would facilitate MOS training and the equipment storage program.

The primary difference between Alternatives #3A and #3B is the location of bulk liquids which includes bulk fuel and bulk water. Within the current ESB structure there is a Water Supply Platoon in the Engineer Support Company that provides water supply support.

Also within the ESB, the Bulk Fuel Company has the mission to receive, store, and distribute Class III and Class III (A) supplies for the MEF. In practice, Bulk Fuel (which in a previous structure actually belonged to Supply Battalion) receives, stores, and essentially provides supply point distribution of fuel except limited pumping of fuel over short distances via the Amphibious Assault Fuel System. Similarly, Supply Battalion has the mission to provide supply support for sustainment of the MEF less Bulk Fuel and Navy-funded stock (mostly aviation items). Supply Battalion is staffed, equipped, and trained to receive, store, issue, and account for the majority of supplies used by the MEF. The inclusion of supply support responsibility for Class III (Bulk Fuel) and water within the Supply Battalion mission is a valid consideration. Regardless of whether bulk liquids is provided by engineer or supply units, the process of providing this support to the MEF will require the use of transportation and other assets outside either of these units.

In summary, the selection of alternative #3A or #3B as the future structure for engineers provides the most flexibility for the MAGTF Commander in tomorrow's warfighting environments. The primary difference between these two alternatives is the location of bulk liquids which could be transferred to Supply Battalion as indicated in Alternative #3B.